

Fine's Problem

LOC \rightarrow Bell

so \neg Bell $\rightarrow \neg$ LOC

But says Fine

Bell \rightarrow J.D.

\uparrow joint distributions
to incompatible
observables

so J.D. \wedge LOC \rightarrow Bell

$\therefore \neg$ Bell $\rightarrow (\neg$ LOC $\vee \neg$ J.D.)

objection (Svetlichny, Redhead, Brown
and Butterfield (1988))

Fine's Theorem says:

Bell $\rightarrow \exists P(J(P))$

\uparrow prob. space \uparrow J.D.

$\rightarrow \exists R(J(R))$ [Wald 1937]

\uparrow self model of P

$\rightarrow J(y)$ for some self model y

But SRBB exhibited a self model x
for which $\neg J(x)$, although Bell is satisfied

Fine's mistake was to
argue from $\neg J(y) \rightarrow \neg \text{Bell}$
to $\neg J(x) \rightarrow \neg \text{Bell}$
i.e. to conflate y with x !

Stapp's Problem

PLCD : Principle of Local Counterfactual Definiteness

the result of an experiment
which could be performed on
on a microsystem has a
definite value which does not
depend on the setting of a
remote piece of apparatus

- 1) Is this true if you don't
assume determinism?
- 2) Can you prove determinism
in the Bell experiment?

Cartwright's Problem

Can one move from

$\text{Prob}^4(a/z)$ to

$\text{Prob}(a/z \wedge y)$

and regard y as a partial
cause of a ?

Does this prove causal
action in the Bell
experiment?

Locality enables us to write (2)
$$[T_1]_{xxx}^\phi = [\sigma_x^1]^\phi + [\sigma_y^2]^\phi + [\sigma_y^3]^\phi$$

etc.

To obtain a contradiction and
hence a proof of nonlocality
choose ϕ to be a simultaneous
eigen state of T_1, T_2 and T_3

This enables us to write

$$[T_1]_{T_1 T_2 T_3}^\phi = [T_1]_{xxx}^\phi$$

etc.
which produces the contradiction

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